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ChemRisk Document No. 1300

Purex Acid Recovery

OAK RIDGE NATIONAL LABORATORY

Operated By

CARBIDE AND CARBON CHEMICALS COMPANY

UCC

POST OFFICE BOX P

OAK RIDGE, TENNESSEE

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SUBJECT: IODINE IN THE ACID RECOVERY VENT SCRUBBER

TO: R. E. Tomlinson

FROM: J. W. Landry

INV. 64

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OAK RIDGE NATIONAL LABORATORY

OPERATED BY
CARBIDE AND CARBON CHEMICALS CORPORATION
FOR THE
ATOMIC ENERGY COMMISSION

POST OFFICE BOX P
OAK RIDGE, TENNESSEE

October 8, 1952

"This document consists of 2 pages, No. 2 of 4 copies, Series A"

Mr. R. E. Tomlinson
Hanford Engineering Works
Richland, Washington

Subject: IODINE IN THE ACID RECOVERY VENT SCRUBBER

The analysis of the samples of 50% NaOH solution drawn October 3 from the acid recovery vent scrubber has been received:

Gross beta	10-3-52	6.27×10^4 beta counts/min/ml*
Iodine	10-6-52	2.70×10^4 beta counts/min/ml
Iodine calculated to	10-3-52	3.48×10^4 beta counts/min/ml
Iodine calculated to	9-11-52	6.91×10^4 beta counts/min/ml
Ruthenium	10-4-52	3.28×10^3 beta counts/min/ml
Zirconium	10-6-52	5.88×10^3 beta counts/min/ml
Niobium	10-4-52	1.31×10^3 beta counts/min/ml
Total Rare Earths	10-4-52	8.38×10^3 beta counts/min/ml

* counted at 10.18% geometry

The iodine was present from thirty-six hours operation of acid-recovery during run HCP-14** which was made from sixty-five day cooled (to 9-11-52) 465 MWD/T material, the iodine in the four previous runs being negligible:

HCP-13	342 day cooled
HCP-12	310 day cooled
HCP-11	114 day cooled
HCP-10	126 day cooled

** HCP-14 EAW: Iodine = 0.03% of gross beta activity. The IAW was 9.14×10^9 gross beta counts/min/ml and 2.7×10^6 iodine beta counts/min/ml.

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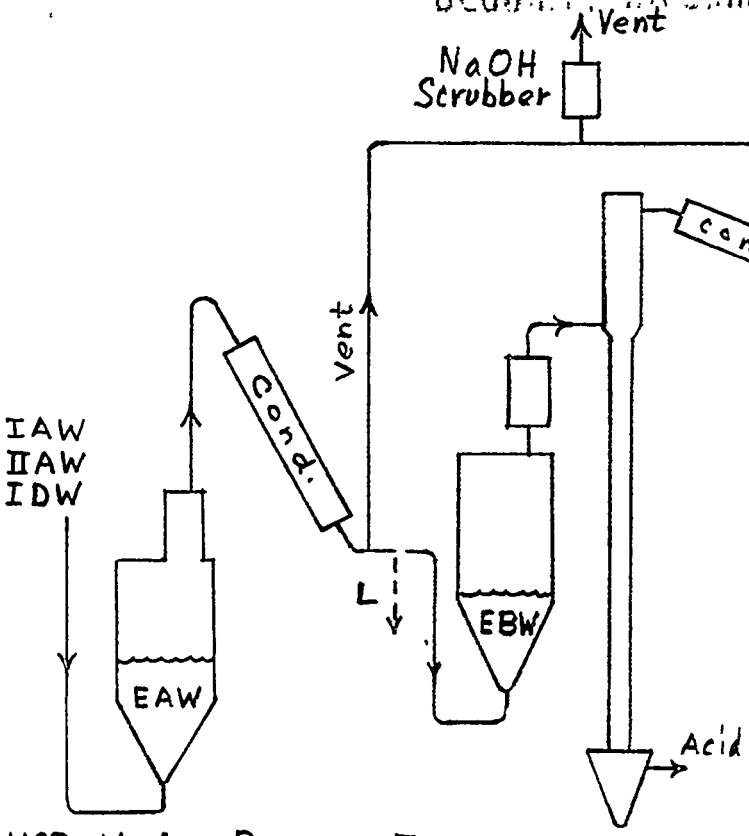
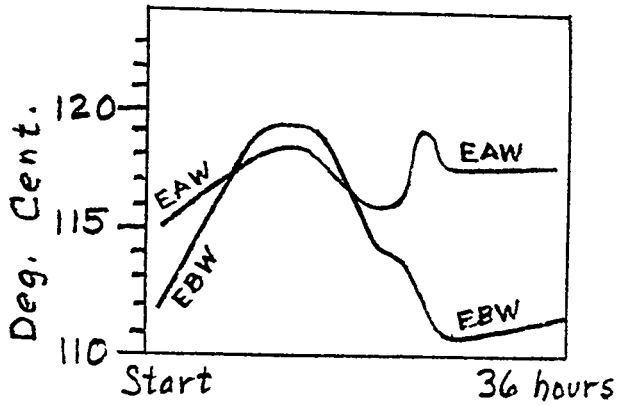


HCP-14 Acid Recovery Flow Diagram



HCP-14 EAW, EBW Boiling Temperatures

A leak of 50% of more of the stream at "L" developed in the beginning of the run and resulted in termination after thirty-six hours.

The average proportions of TRE, Ru, Zr, and Nb in the EAW for the five runs were approximately:

TRE	65% of gross beta activity
Ru	8% of gross beta activity
Zr	5% of gross beta activity
Nb	1% of gross beta activity

Instrument air exceeded the scrubber capacity on several occasions and scrubber efficiency is therefore questionable. The HCP-14 EAW boiled with an estimated acidity of 10.5 N HNO_3 and the preponderance of iodine in the scrubber sample seems sufficient to show iodine volatilized. The anomalous proportions between the other scrubber contaminants might indicate some preferential carryover via volatilization but not enough is known of the scrubber efficiency and TRE analysis for definite conclusions.

Very truly yours,

OAK RIDGE NATIONAL LABORATORY

J. W. Landry
Chemical Technology Division

JWL:aeh